

Puerto Rico Coastal Zone Management Program

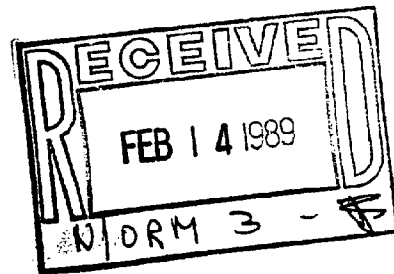
FEB 1989

MANAGEMENT PLAN OF THE SPECIAL
PLANNING AREA OF
PIÑONES-VACIA TALEGA

COASTAL ZONE
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PUERTO RICO COASTAL ZONE MANAGEMENT PROGRAM
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COMMONWEALTH OF PUERTO RICO
DEPARTMENT OF NATURAL RESOURCES
SAN JUAN, PUERTO RICO

WORK PRODUCTS

EXECUTIVE SUMMARY

**MANAGEMENT PLAN OF THE
SPECIAL PLANNING AREA OF
PIÑONES - VACIA TALEGA**

FEB 1989

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Introduction

The coastal zone has a great quantity and variety of resources whose utilization is necessary for the development of the different social, economic and urban activities. Among the most important resources of the coastal zone, the beaches, the fishing areas, the estuaries, the mangroves and **Pterocarpus** areas, the coconut groves and the sand dunes stand out the most.

The coastal resources not only provide diverse opportunities for the incremental use and maximization of economic activity but also because of its peculiar characteristics and its singular beauty these provide for the development of recreational activities of different types. This zone fulfills, in addition, other important functions such as a buffer zone for natural phenomena, a barrier against the incursion of the sea, and it also constitutes an important laboratory for scientific investigation.

The versatility of uses in the coastal zone, as well as its relative scarcity in terms of not being able to satisfy all the demands brought upon it have created a series of conflicts that could affect negatively the achievement of important economic, urban and social objectives. One of the most common conflicts emerges when a certain use is assigned to an area in the coast the development of which would destroy important natural systems. In the majority of the cases the role of these natural resources play in the benefits that these contribute to our economy.

The most important variables that have contributed to the increase of conflictive demands over this coastal zone have been:

1. The increase for the demand of recreational activities;
2. the location of the greater portion of the industrial and commercial activity in the coastal areas;
3. the location of a great portion of the population in the zone and;
4. the establishment of a great portion of the agricultural activity in that area.

Because of the topographical configuration of the Island, as well as other economic factors, it is to be expected that in the

coastal zone would be found the greater part of the residential, industrial, turistic, commercial and agricultural projects in the land will become even more acute.

The Piñones special planning zone (or area)

A portion of the coastal area that typifies to a great extent what has been said above is the Piñones sector which lies within the municipalities of Loíza and Canóvanas. This is one of the most important natural areas in Puerto Rico, and it is at present in a very critical situation because of the pressures brought upon it by conflictive uses. Because of this reason, the Department of Natural Resources (DNR) has designated it as a special planning zone, or area.

The Piñones Special Planning Area (PSPA) provides a series of benefits and it also fulfills certain vital functions from the point of view of the ecological, recreational, cultural, historical value and as a protection against the natural phenomena for the whole metropolitan area of San Juan. It has also been pointed out that it plays a very important role in the stability of the environment of that region.

The PSPA has most extensive mangrove in Puerto Rico. Of the lagoons that it has, is one of the few bioluminescent lagoons in the world (Laguna Piñones), and the other is the largest one in Puerto Rico (Laguna Torrecilla). It provides also a great variety and abundant wild life, and it is an important fish hatchery, a sanctuary for birds, and is a nutrient production area.

Within the PSPA a series of activities are taking place which threaten its ecological stability. One of the most important among these activities is the recreational one. Because of the great variety of natural systems within the area, as well as few options for recreation within the rest of the Island, particularly in the San Juan area, people visit the PSPA by the thousands in search of recreation, relaxation and amusement.

Because there are no effective controls, the recreational activities produce secondary effects that are detrimental to the natural systems. Some of these are the accumulation of solid wastes and raw sewage, the filling of the mangrove areas, the

draining of the canals in order to use them for motor boating, the felling of vegetation, the destruction of the dunes and the generation of (harmful) noise. There are also a series of activities that serve as support systems to the recreation, and which in turn have an adverse impact upon the area. Among these are the proliferation of businesses, the increase in vehicular transit and the use of motor boats in the lagoons.

The lack of a sewage system within the area is another factor that is contributing to the deterioration of the PSPA. The absence of this very basic service within the communities and commercial establishments within the PSPA brings about the inadequate disposition of the waters used. The same wind up eventually in the lagoons and canals thus affecting the system, and thus risking the health of the users.

In addition to the existing activities, there are a series of proposed activities that if carried out without any control, would affect the PSPA in an unpredictable manner. It has been proposed that the development of turistic and residential complexes within the area be allowed. These projects would follow an urban development pattern which could have detrimental effects over the natural systems of the area. Among the impacts that can be expected to take place are the felling of, and filling up of mangroves, the increase in the sedimentation and erosion, the destruction of the dunes, the draining to the canals, the use of pesticides, the increase of vehicular flow, and an increase in illumination. It is maintained that a development such as the one proposed would provoke the disappearance of the present communities within the area.

Controversies and interest groups within the PSPA

There are diverse groups within the PSPA, each one with a particular vision of the type of action to be followed with respect to the area. These particular considerations are the basis for the existing conflicts. The same have generated controversy regarding which would be the most adequate strategy for action for the area and the one that would, in turn, produce the greater benefit for the Puerto Rican society. It is therefore very important to identify the existing groups, as well as their par-

ticular interests, in order to know which is their reaction vis-a-vis the different "issues" that exist there, the identification of the objectives that each of the groups has with respect to the PSPA.

The importance of what has been described above lies in that the guarantee of success of the management is a function of the level of acceptance of the same by the interested parties. This acceptance can only be achieved if these groups perceive that the management strategy represents in some measure their interests, and if they consider that the same is good way to achieve their aspirations.

For this reason, it was established as a principal objectives in the design of the plan the reduction or minization of conflicts among the sectors which in one way or the other are going to be affected by the proposed action. The design of a plan without a strategy directed towards the amelioration of the conflicts will be ineffective because of the poor acceptance that the same would have.

The areas that are ready for this type of approach are those that, like the PSPA, area characterized by complex factors, and interdependent and conflictive from an environmental, economic and political stand point. These are areas with a history of conflicts, as a matter of fact, which have resulted in extreme positions taken by the various groups in regards to different issues.

Among the groups with an interest in the PSPA the following stand out:

1. The owners of the land

The owners of the land comprised by the PSPA can be divided into three groups based on the intentions these have for the use that they would give to their land. The vast majority of these (90%) hope to build a summer residence in order to enjoy the amenities of the area.

A second group is interested in building multilevel structures to be used as housing. In this way they would obtain some economic remuneration for the use of their property. This

group of owners owns around thirty cuerdas (30) of the land within the area.

The last group of owners is composed by two corporations: PFZ Properties and Caribe Associates. The first owns one hundred and eighty cuerdas (180), while the second owns one thousand four hundred cuerdas (1,400). Both companies are interested in developing residential and turistic complexes in their land.

2. The residents

The communities of Piñones, La Torre and Barrio Indio are located within the PSPA. The total population of these communities is 1612 people. The socioeconomic profile of the same is characterized by a high level of unemployment, low level of schooling, lack of infrastructure, high crime rate, and lack of adequate services such as health, garbage collection and recreation.

3. The commercial business owners

Operating within the PSPA are at present about 121 small businesses the vast majority of which are small bars, coffee shops (cafetines), and typical food eateries (friquities). Slightly over half of them have been operating for more than 10 years. About 60% of the same belong to residents of the area. A great many of these are open during the evening, on week ends and holidays only. The average sale intake is \$26.70 per square foot. In the case of the "friquities" the sales intake is \$43.84.

4. The different public institutions and/or agencies

One of the characteristics of the PSPA is the many agencies and institutions that intervene in the management of the area in one way or another. The role of the agencies is that of implementing the laws, rules and statutes that are geared towards insuring that specific objectives assigned to the area are complied with. In the discharge of such duties, often times contradictions emerge among the various agencies due to the conflictive character of the objectives. A case in point is that of the AVR whose aim is to provide the residents of the area with a title deed. This is in direct contradiction with the mandate of the DNR related to areas that are prone to flooding, of which

the area under discussion is one. The agencies that have some jurisdiction over the PSPA are:

1. The Planning Board
2. The Department of Natural Resources
3. The Environmental Quality Board
4. The Permits and Regulations Administration
5. The Commercial Development Company
6. The Army Corps of Engineers
7. The Institute of Culture
8. The Rural Housing Administration

5. The users

Although there is no census of the PSPA users, the same can be estimated to be in the thousands. Their main goal is to take advantage of the last almost limitless possibilities for recreation offered by the PSPA. These numerous possibilities have, in turn, made it possible for varied recreational preference. Most notably among these are fishing, swimming and diving, car racing over the dunes, the contemplation of the scenic beauty, the use of surf boards, boat rides as well as horseback riding and scenic walking tours, bicycle riding, and the general observation of the natural wild life, etc.

6. The municipalities

The municipalities of Loíza and Carolina are important actors in the design of any strategy for the PSPA. The main worry or preoccupation of the municipal authorities of these two towns is that of providing their citizens with a series of adequate services. Chief among this aspect is the case of Loíza which is a municipality with limited economic resources. For this reason, they have considered the PSPA as an important source for the generation of the economic resources so needed by the town. We also have consider the fact that the resident communities within the PSPA that belong to Loíza require municipal inputs in order to better their level and standards of their quality of life.

7. The scientists

The scientific community of Puerto Rico has also shown an interest in the future of the area. They point out that the natural resources present in the PSPA are of such nature and importance that these merit the highest level of protection on the part of the pertinent authorities. However, they also maintain that

the strategy for management that is well designed and directed would provide for the development of certain activities that are not only compatible with the stability of the area (PSPA) but also would have a great economic impact on the area.

Alternative courses of action

In relation to the PSPA, a series of actions have been brought up that have as its base the type of action to be taken with respect to the area. The underlying questions in relation to the issues is: what should be done with the PSPA?. The parties interested in the management of the area have different answers to each one of the issues. These answers are the product of their desire to influence the alternative course of action recommended in such a way that this will incorporate in its totality or in part the different interests.

The four courses of action that are being debated in relation to the PSPA are: preservation, conservation, development, and non-intervention.

Preservation

The premise over which the first of these actions is based is that the natural resources have to be maintained and protected, promoting the preservation of the PSPA and avoiding the destruction and/or irreparable and irreversible damages to the same. Its fundamental objective is to insure for all Puerto Ricans its attractive scenery, and its wholesome, aesthetic, productive and pleasant areas. In addition, the quality of the resources of the PSPA would be protected and the judicious use of such resources that are prone to extinction would be enforced.

The strategy to be followed to insure the preservation would be limited to the establishment of specific controls over any use that could affect the objective of preservation and would recommend steps to be followed in that direction without regards to the consequences that these actions would have over the other parts of the systems. In this sense, for example, all the residents of the area whose housing is built within the mangroves, buffer zone, or that would interfere in some way

with the natural flow of water that feeds or nourishes the system would be relocated.

In the same way, the expansion of those communities that could in the future affect the quality of the natural system would not be permitted. The construction of new buildings, if it is understood that the same would affect in some way the stability of the natural systems, would also not be permitted. The same would happen with the recreational activities and the commercial activities that serve as support, which would be restricted and/or controlled. A moratorium could even be declared for this type of activity in order to achieve the rehabilitation of those areas that are affected by this type of use.

Conservation

The conservation process tries to achieve a balance between the desire to develop some resources and the need for conservation of the same. This strategy would allow certain activities both in the natural resources area as well as the adjacent lands. Because certain activities outside the area of the natural systems threaten the same, it is necessary to propose compatible uses. Among these compatible uses are those activities carried out by the residents, the recreation and commercial activity that serves as support, tourism, fishing, etc. These uses, although would require certain controls and would imply changes in the use of some of the land, and prohibition of other uses, in some cases, would permit the natural resources to remain unaltered.

Non-Intervention

Non-intervention or toleration of the improvised actions that have been occurring there, stems from the premise that the forces or variables that impinge upon PSPA would be maintained unaltered. In this way the development of the activities that are a part of the unfolding of these forces would have a significant effect over the natural systems. This is so because the intensity of the different improvised and uncontrolled activities would increase dramatically. The magnitude of the impact of such acts as recreation, commercial activity, land squatting or invasions, accumulation of solid wastes and raw

sewage, the felling and filling up of mangroves, etc., would be such that could lead to the destruction of the natural system.

Development

The development of the area alternative maintains that the implementation of certain activities is much more fundamental for the economic growth of the region than the protection of the natural system. The main strategy over which this issue is based is the development of residential and tourism complexes within the land comprised by the PSPA. It includes also the expansion of other communities in the direction of the area, and the installation of all the necessary infrastructure in order to serve these uses. Each one of these activities would have secondary impacts that would perhaps be irreversible.

Evaluation of the alternatives

The evaluation of the alternatives is based on objectives that are part of the public policy of the government and that apply to the PSPA. That alternative whose implementation would satisfy all parties concerned, or the greater portion of the objectives, would be the recommended alternative. The objectives revolve around the protection of the natural system from destruction and deterioration, the adequate use of the resources and coastal lands, and the improvement or betterment of the socioeconomic conditions of the residents.

The preservation alternative complies fully with this first objective if we take in to consideration that the same would forbid all those uses that are detrimental to the natural system within the PSPA. However, this alternative does not promote the best utilization of the coastal zone, nor does it promote the social betterment of the communities. The development alternative does not fulfill the objective of protecting the natural resources of the area. The same proposes uses that are incompatible with the ecological balance within the PSPA. The construction activities, the increase in the population and the greater use of area would increase the pressures over the system, affecting it negatively.

The non-intervention alternative would result in a continuous deterioration of the natural system. The uncontrolled activities that have been taking place in the PSPA would increase, as a result of the increase in the population and the increase in the demand for recreational activities. Among the uncontrolled actions that would have a negative impact upon the PSPA are the land invasion or squatting, the accumulation of solid wastes and raw sewage, the felling of vegetation, and the destruction of the nesting and spawning areas.

The conservation alternative is the one best fulfills with the objectives already pointed out. This is so because the same would reserve areas that are necessary to preserve and maintain in its natural state. At the same time, it identifies those uses whose implementation is compatible with the stability of the natural system. In this way, it makes judicious use of the land and the coastal resources. The utilization of the land would have a considerable economic impact upon the area, particularly among the residents. The alternative proposes, in addition, the active intervention in order to promote the socioeconomic betterment of the residents and the infrastructure of the communities. For these reasons the conservation alternative is the course of action recommended for the MPPSPA.

Action Plan

The complexity of the PSPA requires an Action Plan that is functional and that serves as a guide for the systematization of the work to be carried out. The organization of the Action Plan started with the division of the PSPA into various planning zones. The zones are: Coastal zone (Litoral Costero), Aquatic Forest (Bosque Acuático), and the Communities. Because the different planning zones do not behave in a homogeneous manner, the identification of the sectors that promise each one of them was necessary. The identification of each sector or sub-zone is important since its particular characteristics establish different parameters for planning, design and management.

The identified sectors within each zone were the following:

Zone 1: The Coastal Zone

- a. Dunes
- b. Beaches
- c. Coconut grove, northern side
- d. Business
- e. Punta Cangrejos
- f. Punta Maldonado
- g. Punta Vacía Talega

Zone 2: The Aquatic Forest

- a. Mogotes (rocks, cliffs)
- b. Laguna Torrecilla and its canals
- c. Mangrove forests
- d. Laguna Piñones and canals
- e. Ciénaga
- f. Juan Pérez Islet
- g. Small islets (various)
- h. Pterocarpus forest
- i. El Pajonal

Zone 3: The Communities

- a. La Torre
- b. Piñones
- c. Pueblo Indio

A second step was the description of each one of the sectors and the analysis of their problems. The most important objectives to be achieved by the MPPSPA are listed below:

1. To develop the Punta Cangrejos Sector as a center for social, cultural and economic activity. The greater portion of the commercial activity within the PSPA will be relocated in this sector in order to reduce the pressure that this use is exerting over the sensitive natural areas.
2. To control the use of the beaches in such a way that it will be compatible with the stability of the system. The commercial activity within the same will be located within the southern portion or PR 187 highway. The work of reforestation within the sector will be developed as well as areas of bird nesting and fish spawning will be protected.
3. To protect the sand dunes through reforestation, stabilization and control of the activities, thereof.
4. To preserve those areas within the Aquatic Forest that contain resources of unique ecological value and are in imminent danger of extinction. Among these are the Mogotes, the Pterocarpus Forest, the Piñones Lagoon, The Pajonal and La Ciénaga Sectors, the Mangrove Forest, and the islets.

Zone 1: The Coastal Zone

- a. Dunes
- b. Beaches
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- d. Business
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- b. Laguna Torrecilla and its canals
- c. Mangrove forests
- d. Laguna Piñones and canals
- e. Ciénaga
- f. Juan Pérez Islet
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5. To improve the quality of life of the communities by promoting their economic, social and physical development of the same.

Finally, various programs and projects were proposed and evaluated which constitute the strategy for the management of the PSPA. Each project and program was analyzed based on cost, human and financial resources available, and an estimate of the number of jobs, to be created. In addition, a series of criteria for the environment and design were established that will serve as a guide for each one of the programs and projects.

Administrative organization of the PSPA

The Action Plan presented is geared or directed towards the compliance of the basic objective of the MP which is the utilization, in a judicious manner, of the natural, environmental, cultural and human resources of the PSPA. Because of the complexity of the area, as well as its peculiarities, the creation of an organization that will be devoted solely and exclusively to achieving this goal was deemed necessary.

The Board of Directors of the proposed organization, the Corporation for the Management of the PSPA (CMPSPA), would be composed of the representatives of all the interested parties in the area. The Board of Directors would then name an Executive Director or Administrator for the CMPSPA, as well the personnel that is deemed necessary. The Administrator, as well as the working staff would have their main office in the PSPA.

CMPSPA would have among its functions the implementation of the above mentioned projects, as well as the following programs which are suggested be made permanent in nature:

1. An Environmental Maintenance Program for the PSPA
2. An Education and Training Program of the Environment and Natural Resources
3. An Integral Recreation and Culture Program
4. A Community and Commercial Development Program
5. A Construction, Maintenance and Security Program

Conclusions

The main goal of the MPPSPA is that of protecting, managing and judicious use of the natural resources that are so important to the natural system. The MPPSPA includes, in addition, measures that tend to improve the present state of the three existing units within the area. The actions, projects and programs recommended are directed towards the achievement of both objectives. The objectives of the MPPSPA are in accord with the Puerto Rican society in its contextual situation. The same is characterized by being part of an Island that is small, tropical and overpopulated.

The Plan, is not, however a static and final product. It is rather a working document to guide and control the management of the resources and those activities that are a part of this management, as well as those support installations necessary to the same. Therefore, the Plan must be revised periodically in order to incorporate changes that might occur in the system, as well as to implement adequate measures that could face up to unforeseen developments and/or impacts.

The design process of this project was based on the reduction of conflicts among all the sectors that are directly interested in the PSPA. This strategy has generated a good support base for the project. Other considerations that lend strength to the effort that culminated in the Plan were:

1. The uses and projects recommended in the Plan are compatible with the natural system and with the use that the present users make of the area. This will guarantee the enjoyment of the resource, while maintaining the ecological balance.
2. The encouragement of analogous activities that would benefit economically the municipality and the communities.
3. Consideration of the residents as one of the key resources of the area providing mechanism for their welfare.
4. The integration of actions that are administrative, legal, educational and environmental by nature, as integrating elements within an extremely complex system.

The complexity and importance of the PSPA demands that an additional investment of resources be made that will permit the study of its natural system. In the first place, efforts have to be made to understand the intricate ecological relationships

that occur there. The literature available shows that very little is known about this. In the second place, it is of vital importance to determine which is the capacity for carrying of the system in order to establish the level of contact that can be allowed. The result of these and other pertinent investigations will be used to refine and adjust the parameters of intervention recommended by the Plan.

APPENDIX 1

PUNTA CANGREJOS

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Construction of 86 commercial facilities that will include restaurants, coffee shops and soda fountains to be developed in an area of approximately 21,350 square feet.	\$ 678,922	3 Security 86 Businessmen 86 Workers	Commercial Development Company
2. Construction of seven (7) locations for the manufacture and sale of souvenirs and crafts in an area of approximately 1,260 square feet.	31,800	7 Businessmen 7 Workers	Commercial Development Company
3. Construction of a Plaza de las Tres Culturas ("Three Cultures Plaza") where social, cultural and educational activities would take place. An area of 100,000 sq./ft. is recommended, which would be made of concrete and with enough space for fountains, monuments, and furniture. Its location would be of utmost importance within the project and a 24 hour security is recommended.	1,050,000	3 Security 1 Maintenance	Recreation Dev. Company "Land and Water Conservation Program." Institute of PR Culture
4. Construction of board walks for scenic, passive recreation trails around the coastal rim. These areas would have to be well lit during the evening hours and should provide 24 hour security.	150,000	0	Recreation Dev. Company
5. Construction of a portico (50' x 25') of reinforced cement to identify the entrance to the PSPA.	48,000	0	Recreation Development Company.

Punta Cangrejo - continued

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
6. Construction of a pier (150' x 10') to be used by both oar and motor boats, and sea, lagoon and canal excursions by ferry.	21,962	1 Overseer 2 Assistants 2 Helpers	Recreation Dev. Company
7. Construction of an information booth with an approximate area of 400 square feet and a 15 foot height. A four roof is recommended (of steel and wood), with cement blocks siding and a polished cement floor.	31,835	2 Information Clerks	Recreation Dev. Company
8. Construction of a multipurpose recreation area for children including passive recreation areas with tables and benches.	80,000	0	Recreation Dev. Company
9. Construction of two (2) observation towers to be built in wood.	20,000	0	Recreation Dev. Company
10. Construction of a parking area for 250 cars.	126,966	2 Security 1 Overseer 1 Helper	Commercial Dev. Company
11. Carry out a study and research about the migration patterns related to the spawning of certain marine species that come through the Boca de Cangrejos area into the lagoons. The study would evaluate the impact that the recreational fishing that takes place on the Boca de Cangrejos bridge might have.	70,000	5 Specialists	Dept. of Natural Resources
12. Regulate the discharge of oil and fuel into the Torrecillas Lagoon.	--	0	Dept. of Natural Resources.

APPENDIX 2

PUNTA VACIA TALEGA

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. To carry out an archeological study of the sector that will include Phases I-A and I-B, II and extensive excavations as established by the Institute of Puerto Rican Culture. The costs of Phase III will be determined once the work of Phase I-A and I-B is over.	\$ 50,000	3 Archeologists 3 Assistants 2 Helpers	Department of Natural Resources Institute of Puerto Rican Culture "National Oceanic Administration"
2. Adquisition of 56.54 cuerdas of land for the development of a cultural, recreational and educational center. The total amount of land to be acquired, at short term, can be conditioned by the archeological study. The acquisition of the whole sector is recommended.	\$282,700	0	Natural Patrimony Program "Land and Water Conservation Fund Program"
3. Two (2) secure places should be installed for shore fishing. These should provide solid waste receptacles, water spouts, and bulletin boards that would inform about the security and maintenance of the area.	15,360	0	Recreation Development Company
4. Improvement of the existing trails as well as construction of additional board walk areas (2,000 mts. x 3 mtrs.) around the coast for the enjoyment of the sea, passive recreation and educational purposes.	42,000	2 Security 2 Maintenance	Recreation Development Company

Vacía Talega - continued

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
5. Develop an open museum and an amphitheater to offer cultural activities that would serve as a place for showing the archeological material found in the sector. The structure must include an administrative area, an information center, a storage area, an information center, a storage area, maintenance area, and restrooms. This project depends upon the archeological findings to be carried out.	\$125,000	1 Archeologist 1 Helper 1 Maintenance 1 Security	Funds from Foundations
6. Construction of two (2) observation towers at both extremes of the zone.	20,000	2 Educational Guides	State Funds from the Recreation Dev. Company
7. Construction of three (3) sheds to be grouped in five (5) groups. The exact location of these would depend upon the archeological findings.	72,000	3 Security 1 Maintenance	State Funds from the Recreation Dev. Company "National Park Service Program"

APPENDIX 3

DUNES

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Works that will stabilize and reconstruct the dunes.	\$150,000	0	Dept. of Natural Resources
2. Installation of barriers that will prevent vehicular access.	5,000	0	Army Corps of Engineers
3. Construction of access facilities to the beach for those who practice surfing.	10,000	0	Dept. of Natural Resources
4. Installation of signs that will identify the flora and fauna of the area, and that will describe and enhance the importance of the dunes to the whole system.	3,000	2 Maintenance	CMPSPA
5. Installation of signs forbidding the use and entrance to the nesting and spawning areas. The sign will indicate the law and the reasons for such action.	300	0	Dept. of Natural Resources; CMPSPA
6. Acquisition of private land along the coast.	675,000	1 Acquisition Technician	Dept. of NR & CMPSPA
7. Planting of trees and vines on a massive scale to reduce erosion	35,000	1 Botanist 2 Helpers	CMPSPA

Dunes - Continued

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
8. Intensify vigilance against forbidden use. During spawning and nesting seasons, it is recommended that a 24 hour vigilance be provided for the whole sector.	35,000	3 Security	Dept. of Natural Resources CMPSPA
9. Construction of retention walls of 12" thickness and 5' height to provide for the reconstruction process of the dunes.	125,000	0	Dept. of Natural Resources

APPENDIX 4

BEACHES

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Construction of two areas for public showers (2 for each beach).	7,000	0	Recreation Dev. Company
2. Construction of 10 sheds (12' x 20') for each beach. The roof would be of wood with a polished cement floor.	192,000	0	Recreation Dev. Company
3. Provide buoys and other barriers that would insure the safety of the users.	6,500	0	Recreation Dev. Company
4. Installation of 20 garbage collection bins with the PSPA logos duly displayed.	5,000	0	Recreation Dev. Company & private sector
5. Massive and orderly planting of palms and "Uva Playera" (<u>Cocoloba uvifera</u>)	15,000	1 Maintenance Brigade	Recreation Dev. Company
6. Installation of bulletin boards for educational and informative purposes.	15,000	0	Recreation Dev. Company
7. Lifeguards under contract.	58,800	7 Lifeguards	Legislative Funds
8. Relocation of commercial installations now operating at the beaches.		2	Commercial Dev. Company
9. Installation of barriers to prevent motor vehicle parking.	3,680	1	Dept. of Natural Resources

APPENDIX 5

COCONUT GROVES

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Carry out a cleaning and weeding campaign to define the camping areas.	\$ 5,000	3 Maintenance	Dept. of Natural Resources
2. To provide sanitary installations, showers, shed and light and water outlets in order to develop the camping areas.	60,000	0	Recreation Dev. Company
3. Define the routes to be used as trails for educational and passive recreation purposes.			Dept. of Natural Resources

APPENDIX 6

PUNTA MALDONADO

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Relocation of six (6) homes and three (3) commercial establishments that are now operating in the area.	Compensation Housing \$ 135,000	0	Funds from CDBG from the Iofza Municipality & Rural Housing Administration
	Acquisition of the structures \$ 166,500		
	Moving expenses \$ 3,600		
2. Construction of an observation tower.	10,000	1 Security 1 Guide	Recreation Dev. Company
3. Improvement of the existing trails and definition of routes for educational excursions and passive recreation.	7,300	2 Maintenance	Recreation Dev. Company
4. Construction of installations for shore fishing that will include garbage disposal receptacles, water spouts, sheds and information signs about the proper care of the ecosystem and security measures.	10,800	1 Maintenance	Recreation Dev. Company

APPENDIX 7

COMMERCIAL SECTOR

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Construction of four (4) commercial group- ings for the location of all business now in existence, in haphazard form, along PR 187. This project will take place by stages. It is recommended that the first commercial grouping to be built be located in the area known as Tres Palmitas beach, in the south portion of highway PR 187.	<u>Tres Palmitas</u> \$ 225,000	3 Security 2 Maintenance 21 Business owners	Recreation Dev. Company
	<u>Ensenada de</u> <u>Vačia Talega</u> \$ 225,000		
	<u>Ia Pocita</u> \$ 225,000	42 employees	
	<u>Punta</u> <u>Cangrejos</u> \$ 225,000		
2. Create a program of consultancy in the administrative and management training areas, in coordination with the Dept. of Commerce.	12,000	2 Management, Marketing and Administrative Procedure Spe- cialists	Commercial Dev. Company
3. Relocation of 97 businesses that are now in operation within the PSPA. This action would be carried out in stages. It is recommended that the Division of Acquisition and Relocation of the Highway Authority be consulted prior to the process. The Division's personnel has the experience and legal and statutory expertise and knowledge to deal with this phase.	95,000	1 Relocation Coordinator	Recreation Dev. Company Commerce Dept. Highway Authority

APPENDIX 8

ISLETS

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Construction of a small boats dock (20' x 10') at the Juan Pérez Islet	\$ 8,000	1	Recreation Dev. Company
2. Construction of light structures to be used for exhibitions (1,000 square feet)	60,000	1 Maintenance 1 Overseer 2 Guides	CMPSPA
3. Construction of educational trails for excursions.	7,300	2 Guides	CMPSPA
4. Prepare an operating procedures manual and a rule book for the islets.	1,000	0	CMPSPA
5. Identify the trails with signs as well as the existing flora.	1,200	1 Maintenance	CMPSPA
6. Construction of an observation tower.	10,000	0	Recreation Dev. Company

APPENDIX 9
MOGOTES

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Prepare an inventory of the flora and fauna of the area, including a taxonomic and behavior study of the species therein.	\$ 30,150	1 Biologist 1 Helper	Dept. of Natural Resources
2. Conduct scientific investigation in coordination with the University of Puerto Rico to determine the carrying capacity of the mogote to provide the water flow system in times of drought.	97,360	15 Students	Right to Work Admini. Dept. of Natural Resources
3. Evaluate the degree of contamination of the soil and water caused by the operation of the Municipal Dump of Caroline at the PSPA.	132,342	15 Students (temporary) 1 Specialist (soil) 1 Hidrologist	Right to Work Admin. Dept. of Natural Resources
4. Establish a program for the education and orientation of the residents of the community of Pueblo Indio about the importance of the preservation of the mogotes.	9,000	1 Coordinator	Right to Work Admin.

APPENDIX 10

PTEROCARPUS FORESTS

PROJECTS/DESCRIPTION	ESTIMATED COST	DIRECT EMPLOYMENT	SOURCES OF FUNDS
1. Prepare a contingency plan in case of extreme drought.	\$ 3,000	1 Biologist 1 Assistant	Dept. of Natural Resources
2. Carry out research in coordination with the University of Puerto Rico to determine the quality and quantity of water that the forest receives.	110,500	10 Students 1 Specialist 1 Biologist	Right to Work Admn. University of P. R. Dept. of Natural Resources
3. Prepare the rules and regulations concerning the access and management of the area.	2,000	1 Biologist	Dept. of Natural Resources
4. Identification of the educational routes and placing of signs for the forest.	4,500		CMPSPA

